

DETERMINATION OF SEX IN ADULT RICE AND
GRANARY WEEVILS

(Coleoptera: Curculionidae)

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The rice weevil, *Sitophilus oryzae* (L.) and the granary weevil, *S. granarius* (L.) are the most important destructive members of the genus *Sitophilus*. These insects are very small and resemble each other in general form and biology, but can be easily distinguished from one another. In contrast to the granary weevil, the rice weevil is smaller, has four rufous spots on the elytra, possesses functional wings and the punctuations on the body are circular instead of oblong.

Although the species can be easily distinguished, the separation of the sexes based upon external morphological characters offers a more difficult problem. Therefore, an investigation was conducted to determine what characters might be useful in separating the sexes. Male and female weevils of both species, about two months old, were secured from a mass culture maintained at room conditions. Adults were etherized before they were measured. The body length (prothorax and abdomen) and the width of the rostrum (middle part) were measured in dorsal aspect. The length of the rostrum, including the base of the eyes to the tip of the mandibles, was measured in lateral aspect. It should be mentioned here that it is very important to make measurements in the same aspect for each part in each individual. In making measurements a binocular microscope equipped with an eye piece micrometer was used. More than 50 individuals of each sex of each species were measured. The characters on the rostrum can be easily seen when the weevil is held dorsally on the forefinger with the thumb covering the abdomen and thorax and then placing it under a binocular of high magnification in the presence of bright light.

It was found that the body length was of no value in determining the sexes. It was also observed that the age and size of the weevils influenced the size of the rostrum, but this influence became very insignificant as adults reached maturity. The useful characters in separating the sexes, however, were found to be present in the rostrum and the tip of the abdomen.

The male rostrum is comparatively shorter and wider as compared to the narrower, longer and more cylindrical rostrum of the female. In this regard Birch (1944) observed that the rostrum of the male rice weevil was shorter and thicker. Also, in the male the dorsal surface of the rostrum is closely and strongly punctured whereas in the female the punctures are superficial and sparse and rarely occur on the distal end. Richards (1947) separated the male rice weevil from the female on the basis of punctures on the rostrum. These distinguishing differences between the sexes are shown in figure 1. It should be pointed out here that the difference in the density of punctures on the rostrum of male and female granary weevils is not so well marked as is in case of rice weevils. With some practice, however, the female granary weevil can be easily distinguished from the male by the presence of a more slender and cylindrical rostrum.

TABLE 1

Measurements of rostri of male and female rice and granary weevils.

Species	Sex	Length of the rostrum in mm.		Width of the rostrum in mm.		Ratio of width of the rostrum to the length of the rostrum	Ratio of lengths of male rostrum to female rostrum	Ratio of widths of male rostrum to female rostrum
		Range	Average	Range	Average			
Rice weevil	Male	0.785- 0.075	0.893	0.161- 0.200	0.179	1.0 : 5.0	1.0 : 1.2	1.2 : 1.0
	Female	0.856- 1.200	1.036	0.133- 0.163	0.147	1.0 : 6.9		
Granary weevil	Male	0.875- 1.250	1.063	0.175- 0.225	0.207	1.0 : 5.1	1.0 : 1.4	1.6 : 1.0
	Female	0.963- 1.330	1.176	0.150- 0.187	0.169	1.0 : 6.9		

A clear picture of the relation between sizes of rostri of male and female weevils can be obtained from table 1. In both species the male rostrum is shorter and wider than that of the female. It is also seen from the table that in the male and the female the ratio between the width and the length of the rostrum is approximately the same in each species. The ratio between lengths or widths of male and female rostri, however, is not equal and varies slightly in each species. In the female the range of variation in the width of the rostrum is less than is that in the male although the variation in the length of the rostri is equally great in both sexes.

In addition to the above characters the male rostrum is much less curved than is that of the female. This is most apparent when individuals are viewed from the side. Also when seen from the

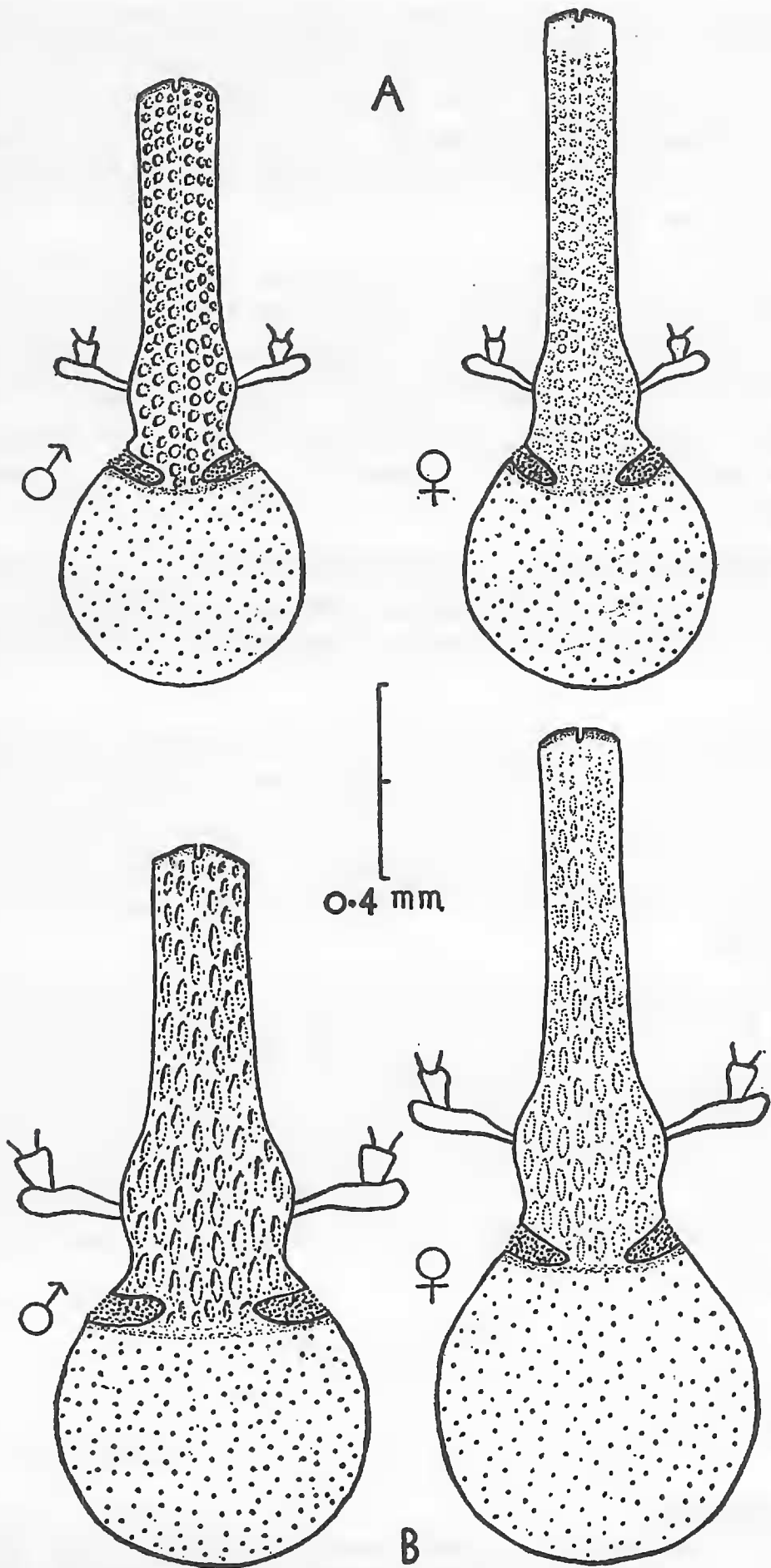


Fig. 1. Rostrum of male and female weevils. A, the rice weevil *Sitophilus oryzae* (L.); B, the granary weevil, *S. granarius* (L.).

dorsal aspect the male rostrum is slightly narrower in the center and wider at the ends than is that of the female. The female rostrum, particularly the anterior part, when viewed under a strong light appears brighter. This is especially true in the case of the rice weevil where the rostrum is lightly punctured, the distal end being almost devoid of punctures.

Although not as suitable as the characters given for the rostrum, the shape of the last abdominal sternite can be used to separate the two sexes. Richards (1947) used this character to distinguish male and female granary weevils. He found that in the male the sternite is more ventrally flexed than in the female. While this character is not so pronounced in the rice weevil it can be used in separating the sexes.

Hundreds of adults of both species which were sexed on the basis of characters of the rostrum mentioned above were dissected to verify the sex and in all cases examined, these characters held true.

Summary:—In both the rice weevil and the granary weevil the male rostrum is comparatively shorter and wider and its dorsal surface is closely and strongly punctured as compared to the female rostrum which is longer, thinner and more cylindrical in form, the punctures being superficial and sparse, rarely occurring on the distal end.

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